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DEC 17 2008

CLAIMS

Claim 20 (currently amended): A method of targeting cells in an individual for liposomal delivery of an alpha particle-emitting radionuclide thereto with reduced systemic release of radioactive decay intermediates comprising the steps of:

entrapping passively said radionuclide within small liposomal vesicles;

incorporating said entrapped radionuclide into the aqueous phase of large liposomes, said liposomes having a diameter sufficient to retain at least a majority of the radioactive decay intermediates of said radionuclide, said liposome comprising:

polyethyleneglycol-linked lipids (PEG-lipids) on outer membranes thereof; and

a targeting agent attached to the PEG-lipids, said targeting agent specific to the cells; and

delivering said radionuclide to the cells whereby said targeting agents target the cells while retention within said large liposomes of said radioactive decay intermediates produced by said radionuclide reduces the systemic release thereof.

Claim 21 (original): The method of claim 20, further comprising:

labeling said smaller liposomal vesicles with biotin.

Claim 22 (original): The method of claim 20, further comprising the steps of:

preinjecting the individual with empty large liposomes; and

saturating the reticuloendothelial organs to reduce non-tumor specific spleen and liver uptake of said radionuclide upon delivery thereof.

Claim 23 (original): The method of claim 20, wherein said large liposomes have a diameter of about 600 nm to about 1000 nm.

Claim 24 (original): The method of claim 20, wherein said targeting agents are antibodies, peptides, engineered molecules or fragments thereof.

Claim 25 (original): The method of claim 24, wherein at least some of said antibodies are Herceptin.

Claim 26 (original): The method of claim 20, wherein said targeted cells are cancer cells, virally infected cells, autoimmune cells, or inflammatory cells.

Claim 27 (original):The method of claim 20, wherein said large liposomes further comprise a stabilizing agent incorporated therein or have an

aqueous phase with a high pH thereby further facilitating retention of said radioactive decay intermediates.

Claim 28 (original):The method of claim 27, wherein said stabilizing agent is a phosphate buffer, insoluble metal binding polymer, resin beads, metal-binding molecules or halogen binding molecules.

Claim 29 (original):The method of claim 20, wherein said large liposomes further comprise additional molecules, said molecules facilitating membrane fusion with target cells or facilitating endocytosis by target cells.

Claim 30 (original): The method of claim 20, wherein said alpha particle emitting radionuclide is incorporated into the aqueous phase of said small liposomal vesicles as a chelation compound.

Claim 31 (original): The method of claim 20, wherein said alpha-particle-emitting radionuclide is ^{225}Ac, ^{223}Ra, ^{213}Bi, or ^{211}At.

Claim 32 (original):The method of claim 20, wherein said alpha particle-emitting radionuclide is a daughter of a beta particle-emitting radionuclide, wherein said beta particle-emitting radionuclide is entrapped within said small liposomal vesicles.

Claim 33 (original): The method of claim 32, wherein said beta particle-emitting radionuclide is ^{212}Pb.